

① Evaluate

② e^5

$$\approx 148.413$$

③ $2e^3$

$$\approx 40.171$$

② Solve for x

④ $7^x = 12$

$$x = \frac{\log 12}{\log 7}$$

$$x \approx 1.2770$$

⑤ $\log_3 30 = x$

$$3^x = 30 \quad x = \frac{\log 30}{\log 3}$$

$$x = 3.0959$$

⑥ $\log_3 x = 4$

$$3^4 = x \quad x = 81$$

⑦ $\frac{3e^x}{3} = \frac{42}{3}$

$$e^x = 14 \quad x = 2.639$$

$e \rightarrow$ natural base

$\approx 2.718281828 \dots$

continuous growth

$$10^x = y$$

Inverse

$$\log x = y$$

$$10^x = 7$$

$$x = \log_7 7$$

$$y = e^x$$

Inverse

$$\log_e x = y$$

$$\rightarrow \ln x = y \quad \star \star$$

$$e^x = 7$$

$$x = \frac{\log 7}{\log e}$$

or

$$x = \ln 7$$

$$\text{b/c } \cancel{e^{\ln x}} = x$$

$\ln 7 = x \rightarrow$ logarithmic form

$e^x = 7 \rightarrow$ exponential form

Solve for x

$$(a) \ln_e(3x+5)^2 = 4$$

$$\sqrt{e^4} = \sqrt{(3x+5)^2}$$

$$\begin{array}{r} e^2 = 3x + 5 \\ -5 \quad -5 \end{array}$$

$$\frac{2.389}{3} = \frac{3x}{3}$$

$$x = 0.7964$$

$$(b) \begin{array}{r} 7e^{2x} + 2.5 = 20 \\ -2.5 \quad -2.5 \end{array}$$

$$\frac{7e^{2x}}{7} = \frac{17.5}{7}$$

$$\ln e^{2x} = \ln 2.5$$

$$\frac{2x}{2} = \frac{\ln 2.5}{2}$$

$$x = \frac{\ln 2.5}{2}$$

$$x \approx 0.4581$$

$$\textcircled{1} \ln\left(\frac{x+2}{3}\right) = 12$$

$$e^{12} = \frac{x+2}{3}$$

$$3e^{12} = x+2$$

$$3e^{12} - 2 = x$$

$$x \approx 488,262.4$$

$$\textcircled{2} e^{\frac{2x}{5}} + 7.2 = 9.1$$

-7.2 -7.2

$$e^{\frac{2x}{5}} = 1.9$$

$$\ln e^{\frac{2x}{5}} = \ln 1.9$$

$$5 \cdot \frac{2x}{5} = \ln 1.9 \cdot 5$$

$$\frac{2x}{2} = \frac{5 \ln 1.9}{2}$$

$$x = \frac{5 \ln 1.9}{2} \quad \boxed{x \approx 1.6046}$$

① $25^{2x+1} = 144$ solve for x

$$2x+1 = \frac{\log 144}{\log 25} \Rightarrow \begin{array}{cc} 2x+1 & = & 1.544 \\ -1 & & -1 \end{array}$$

$$\frac{2x}{2} = \frac{0.544}{2} \Rightarrow \boxed{x = 0.272}$$

3 things

$$7^x = 47$$

$$\log_7 47 = x$$

$$x = \frac{\log 47}{\log 7}$$

② $\log_3(x+1) - 4 = 0$ solve for x
 $\quad \quad \quad +4 \quad +4$

$$\log_3(x+1) = 4 \rightarrow \text{write in exponential form}$$

$$3^4 = x+1$$

$$81 = x+1$$

$$\boxed{x = 80}$$

③ $\frac{3e^{-2x}}{3} = \frac{14}{3}$ solve for x

$$e^{-2x} = 4.66 \quad \text{take ln of both sides} \quad \ln e^{-2x} = \ln 4.66$$

$$\frac{-2x}{-2} \approx \frac{1.541}{-2} \quad \boxed{x = -0.77}$$

④ Invest \$5000 at 3% APR (compounded monthly).

How long to double - solve algebraically

$$f(x) = 5000 \left(1 + \frac{0.03}{12}\right)^x \quad \text{months}$$

$$\frac{10000}{5000} = \frac{5000}{5000} \left(1 + \frac{0.03}{12}\right)^x$$

$$2 = \left(1 + \frac{0.03}{12}\right)^x$$

$$x = \frac{\log 2}{\log \left(1 + \frac{0.03}{12}\right)} \quad \boxed{x \approx 278 \text{ months}}$$

$$\ln(uv) = \ln(u) + \ln(v)$$

$$\ln\left(\frac{u}{v}\right) = \ln(u) - \ln(v)$$

$$\ln(u^n) = n \ln(u)$$

$$3 \ln 14 = x$$

$$\ln 14^3 = x$$

$$e^x = 14^3$$

Sect. 8.5

2-12 (even), 23, 30-45, 99

Sect. 8.6

1-5, 23-30, 44-46